

APPENDIX E

Inseason Assessment of 1984 OPI Coho Stock Status

Prepared by

California Department of Fish and Game

and

Oregon Department of Fish and Wildlife



Inseason Assessment of 1984 OPI Coho Stock Status

A Progress Report  
of Technical Information

Presented to

Pacific Fishery Management Council  
Salmon Plan Development Team  
California Department of Fish and Game  
Oregon Department of Fish and Wildlife  
Washington Department of Fisheries

Prepared by

California Department of Fish and Game  
(Ocean Salmon Project)

Oregon Department of Fish and Wildlife  
(Ocean Salmon Management Program)

June 20, 1984



## INTRODUCTION

### Background

The ocean coho salmon fishery within the Oregon Production Index (OPI) area has been plagued by a multitude of problems in recent years. Heavy vessel capitalization and strong expansion of a variety of user groups has resulted because of the success of expanded hatchery production since the mid 1960's. Problems related to over capitalization have been compounded by severely lowered coho stock abundance since the mid 1970's resulting from poorer than normal ocean environmental conditions (i.e. ocean coastal upwelling), heavy fishing pressure, and/or other factors as yet unidentified. Additionally, the promising 1983 ocean coho season, with an allowable harvest established at 1,151,000 coho (highest since 1979) was crushed by the onset of a severe El Nino event. Evidence of the catastrophic impact of "warm water", viewed by many oceanographers as the worst El Nino in this century, was shown by the final 1983 ocean coho catch of 658,000 fish; only 57 percent of the allowable quota. This occurred, despite fishing seasons that extended nearly the entire summer. Correspondingly, the total post-season OPI coho stock size was only 42 percent of the preseason OPI coho "jack prediction". Most importantly, the escapement of natural adult coho to Oregon coastal streams in the OPI area was only 58,000 fish; 41 percent of the Pacific Fisheries Management Council's 1983 rebuilding goal of 140,000 fish.

### OPI Coho Stock Status for 1984

The Pacific Fishery Management Council (PFMC) had a number of severe resource problems and conflicting issues facing it during the 1984 salmon management planning process. OPI coho were anticipated to be severely depressed in 1984 due to a combination of severe environmental events and previous low escapement. Parental year escapement of Oregon coastal natural coho (1981 brood year) contributing to 1984 production was at near record low levels. Fry production from this low parent year escapement was negatively impacted by severe flooding on the Oregon coast in the winter of 1981-82 which displaced eggs during incubation. Progeny of the 1981 brood that survived to be smolts were adversely impacted again because they entered the ocean during the severe El Nino conditions that existed in the spring of 1983. Low survival from the 1981 brood was confirmed by the 1983 jack returns that were the lowest since major increases in hatchery production occurred in the early 1960's. Abnormally high adult mortality (after jack returns) for 1981 brood coho was also felt by the SPDT to have occurred due to the continuing impact of El Nino through January of 1984.

The assumptions and rationale used to develop 1984 coho stock size predictions and develop seasons, within the constraints of these predictors that will meet PFMC escapement and allocation objectives, are outlined in the 1984 PFMC salmon planning documents.

It was the consensus of the PFMC's Salmon Plan Development Team (SPDT) and a special "Blue Ribbon" panel of PFMC scientific advisors and independent oceanographers that El Nino, as evidenced by the occurrence of elevated water temperatures and sea levels, existed north of Central California from mid to late 1982 until late 1983 or early 1984. The Council adopted a procedure for additional El Nino mortality that treated each of the main OPI coho stock components separately (public hatchery, private hatchery, and wild fish).

This El Nino adjustment accounts for additional adult coho mortality that took place between the time jacks returned and the end of the El Nino event. It was assumed that El Nino induced mortality was constant over the time period that coho salmon were exposed to the condition.

The rationale for an El Nino adjustment was strengthened by data collected by ODFW during an earlier El Nino event in 1957 and 1958. Preseason predictions of returning natural coho to a central Oregon coastal stream system overpredicted the run size by approximately 40 percent for both 1958 and 1959.

Following the El Nino reduction, the constraints of associated coho and/or chinook stocks, and the need to reach the PFMC goal for Oregon natural coho escapement of 135,000 in 1984, only 180,000 coho were available for ocean harvest by all users during the 1984 season. Approximately 55,000 coho were allocated north of Cape Falcon and 125,000 south of Cape Falcon including California. Under an allocation plan adopted by the Council, available harvest at this level was generally allocated to ocean recreational fisheries with minor directed all-species commercial fisheries and allowances for hooking mortalities in an all-species-except-coho troll fisheries.

#### 1984 OPI Fisheries and Concerns

Since the beginning of the all-species-except-coho fishery on May 15, some fishermen have reported large numbers of coho salmon being hooked and released in an area generally from Cape Mendocino to the Oregon-California border. Coho were reported to be considerably larger than normal for this time of year (up to 8 pounds round weight). This fueled speculation that these fish "carried over" from 1983 and were 4-year-old coho. Fishermen were immediately concerned that if this were true, and could be verified, the PFMC would need to reconsider its 1984 ocean regulations to allow for additional harvest. Also, many fishermen interpreted the apparent abundance of large numbers of coho in a localized area to indicate the preseason OPI coho stock size estimate was too low or that private hatchery fish were contributing at higher than anticipated levels. The Council was concerned by these reports, and Chairman Jack Donaldson formed a Task Group from the Council to conduct a public meeting in Eureka, California, on June 7, to discuss the current coho salmon status off California and receive testimony from fishermen.

Oregon and California began observer programs aboard commercial salmon troll vessels operating out of northern California and southern Oregon ports to monitor the fishery and keep the Council and states apprised of the current situation. The following report summarizes the results of this observer program to date, and provides an inseason status report on OPI coho in 1984.

## OBSERVER PROGRAM

Soon after the May 15 opening of the ocean troll chinook season in northern California and southern Oregon, both California and Oregon began an onboard observer program in the troll fishery. Concern was expressed by fishermen, the Council, and state officials that an inseason evaluation of the 1984 coho stock status was needed. Numerous reports of higher than normal numbers and size of coho had been received from fishermen in northern California waters.

California began its program in late May by putting department personnel on troll vessels out of ports from Crescent City to Eureka. This activity continued as weather and personnel permitted in this area until the closure of the first chinook fishery period on June 6. Since June 6 the California Department of Fish and Game has conducted a special "test fishery" on selected trollers to continue to assess the coho "shaker" rates, areas of coho abundance, condition, and age of fish.

Oregon developed a similar program to observe the ocean troll fishery in southern Oregon (Coos Bay south) beginning in early June. The Oregon Department of Fish and Wildlife and the Oregon troll industry jointly sponsored a cooperative program to put full-time observers continually at sea out of Coos Bay and Brookings during open chinook fishing periods. These observers were supplemented by ODFW personnel going out on additional vessels as available. Weather, as well as restricted fishing periods, limited the level of observer activity. Observers were active in the Coos Bay area until the chinook fishery closed June 15.

Although each State's observer program varied somewhat, the following goals and objectives were established:

- (1) Record the catch of both coho and chinook for each day of fishing.
- (2) Obtain scales from coho for age, growth, and origin analysis.
- (3) Recover snouts from all fin-clipped fish to analyze coded wire tags.
- (4) Measure and/or weigh coho as possible.
- (5) Record other observations on fishing technique, depth, stomach contents, water temperature, etc.
- (6) Submit periodic summary reports of observer data to PFMC and the states.

## BIOLOGICAL ASSESSMENTS

### Coded Wire Tag (CWT) Analysis

Through June 18, 1984, CWT's have been recovered from 34 coho (Table 1). All recoveries were made from coho caught off the California coast from May 16 through June 13, 1984. Of the 34 tags, 15 were from Oregon coastal hatchery releases, 15 from the Columbia River and four from California hatcheries. These tags represent stocks that were expected off California in May and June. There were no recoveries of CWT coho originating from private hatcheries.

All of the 34 tagged fish were 3-year old coho and were similar in size to non-tagged coho from the same fisheries (Figure 1). This similarity in size distribution of tagged 3-year-old coho and non-tagged coho indicates that the non-tagged coho are also 3-year-olds.

### Condition and size of Coho

Body condition for coho salmon, as indicated by weight for a fish relative to length, has apparently returned to normal in 1984. Coho observed in the California/Oregon observer program in 1984 have body condition that is much better than observed in 1983 and is similar to non-El Nino years.

The average dressed weight of coho salmon collected in the 1984 California observer program was greater than that observed in previous years June 1-15 ocean troll coho fisheries (Table 2). The reason for the slightly larger size of coho in 1984 is not known, but is probably a combination of high ocean productivity this spring off the northern California coast, better growth due to low overall stock abundance, and elimination of the May troll coho fishery which selectively removes larger fish. Both scale and CWT analysis indicate there are no 4-year-old coho present and are therefore not a factor contributing to the above average size of coho.

### Scale Analysis

Coho scales from the California troll and recreational fishery and the Oregon troll fishery have been examined for incidence of 4-year-olds and frequency of accelerated patterns (private hatchery). Within a sample of 191 scales no 4-year-old coho were found. A check or growth interruption corresponding to the summer of 1983 had previously been assessed as an additional ocean winter annulus, but examination of known age CWT coho indicated that the check was in fact a summer growth interruption. Accelerated coho of private hatchery origin made up 5 of the 122 samples examined for freshwater growth characteristics.

The high contribution of 3-year old coho with the complete absence of 4-year-olds is consistent with preseason expectations, and the private hatchery accelerated contribution is at or below expected levels.



## CATCH RATE ANALYSIS

It has been suggested that 1984 coho catch rates in the early season chinook-only troll fishery or from troll vessels with on-board observers be used to adjust preseason predictions of OPI coho abundance. For this to be warranted, inseason abundance assessments based on catch rate must be more reliable than preseason predictors. With the present data base, preseason stock abundance forecasts based on jack returns are much more accurate than any assessment that can be made using inseason catch rate information.

Details of the 1984 preseason coho predictors are in the 1984 PFMC salmon management plan. These preseason coho predictors are the basis of 1984 ocean regulations, and forecast a total coho abundance in the OPI area of about 700,000 (all stock components). The reliability of these predictors are reviewed annually by state agencies, as part of the PFMC process and have been evaluated by the General Accounting Office (GAO) of the US Government in 1983. In the GAO review, the OPI coho prediction was described as the best salmon stock size predictor available for any west coast and Alaska salmon stock. In 1984, preseason predictions were modified due to additional El Nino-related mortality that could not be accounted for by the standard predictor. These El Nino adjustments were developed and reviewed by the PFMC salmon team, state agencies, and a special "Blue Ribbon" review panel that included user representatives, oceanographers, and PFMC advisors and scientists.

It is not currently possible to improve these preseason forecasts based on presently available catch rate information. Major reasons that available 1984 catch rate information cannot be used to assess coho abundance are:

1. Oceanographic conditions have a major nonquantifiable influence on coho distribution and susceptibility to being caught. In specific areas or times, such as the start of the 1982 troll coho season off Oregon, coho will be concentrated in a relatively narrow band of water. When these conditions exist, coho catches will frequently be very good even though total numbers of coho are relatively low.

In mid-May of this year, an area of ocean upwelling developed off Northern California, producing a relatively sharp temperature gradient that probably acted to concentrate coho salmon in a narrow band of water running north to south along the coasts (Figure 2).

2. From 1979 to 1983, coho catch rates in California early season all-species troll fisheries have not been a reliable indicator of OPI coho abundance (Figure 3).
3. Very limited baseline data is available on incidence of coho salmon caught and released in chinook-only fisheries. Without a performance history for these fisheries it is very difficult to interpret if catch rate relates to coho abundance and, if so, how it can be used to reassess abundance.
4. Data collected through the observer program is difficult to interpret because of limited sample size, limited area sampled and the lack of sufficient baseline data.

Information from troll vessels with observers (northern California and southern Oregon combined) indicate a catch rate of 10 coho per day (Table 3). This catch rate is certainly within the expected range with a preseason OPI area total stock abundance forecast of 700,000 coho and oceanographic conditions that may be acting to concentrate the fish.

Reports from trollers indicating generalized high coho catches off California (up to 300 per day) are extremely difficult to validate and interpret. The catch rate for the entire fleet, the area encompassed by the good catches and the percentage of the total coho population in this area are not known. Given these uncertainties and the lack of baseline data, it is not possible to develop an improved estimate of stock size at this time using this information. At other times when OPI troll coho fisheries have been closed, similar claims of high catches and seemingly inexhaustible coho supplies have been made and then disproven when final accounting was completed.

In future years under situations of more normal coho abundance, it may be possible to use catch rate information to modify preseason stock size predictors. In these situations catch rates from several weeks of directed coho fisheries over a broad geographic area will be available along with a performance history for these fisheries. Even in this situation where extensive catch rate information and corresponding baseline data is available, extensive analysis will be required to determine how to use this information to improve stock abundance forecasts and to develop criteria for implementation of results. Finally, to implement any inseason stock size adjustments, review by the Council Salmon Plan Development Team and approval by the PFMC will be needed.

## RECOMMENDATION

The information discussed in this report was evaluated in an attempt to identify any basis for changes in the 1984 OPI coho stock level or composition that would justify altering the PFMC's management plan.

It is recommended that 1984 OPI area coho seasons and harvest quotas not be modified. The basis for this recommendation is that preseason forecasts of coho abundance are more reliable than any new assessment that can be developed based on inseason observations gathered in 1984 and analyzed for this document. Seasons developed using these preseason forecasts are designed to meet escapement and allocation objectives of the PFMC. If seasons are liberalized there is a high probability that both allocation and escapement objectives will not be realized.

Table 1. 1984 California ocean fisheries coho coded wire tag recoveries available on June 19, 1984.

Date	Catch Area	Tag Code	Origin	Age	Fork Length (cm)	Dressed Weight (lbs)
5-16	Eureka	7-25-61	Nehalem	3	68.7	NA
6-1	Moss Landing	7-24-43	Alsea	3	63.7	6.4
6-1	Moss Landing	7-26-11	Trask	3	62.5	6.1
6-2	Moss Landing	7-26-08	Trask	3	65.4	6.9
6-2	Moss Landing	7-26-42	Alsea	3	52.6	6.9
6-4	Eureka	7-27-34	Sandy	3	55.2	NA
6-10	Eureka	7-24-51	Vand. Pd. (Col. R.)	3	61.5	NA
6-11	Half Moon B	7-24-35	Alsea	3	68.5	NA
6-11	Half Moon B	7-26-40	Umpqua	3	57.5	NA
6-12	Crescent City	7-24-50	Siletz	3	55.5	3.6
6-12	Eureka	63-26-57	Washougal (Col. R.)	3	52.0	NA
6-12	Crescent City	63-26-45	Washougal	3	62.0	5.0
6-12	Crescent City	63-26-29	Cowlitz (Col. R.)	3	63.0	5.0
NA	Moss Landing	7-25-59	Nehalem	3	64.0	8.0
6-13	Moss Landing	5-11-35	Eagle Cr. (Col. R.)	3	61.9	6.6
6-13	Moss Landing	7-24-51	Vand. Pd.	3	64.2	6.9
6-13	Moss Landing	6-59-55	IGH (Klamath)	3	58.0	5.4
6-13	Moss Landing	6-59-55	IGH	3	53.5	4.2
6-13	Moss Landing	5-11-34	Eagle Cr.	3	62.5	7.2
6-13	Moss Landing	7-26-39	Umpqua	3	63.8	6.4
6-13	Moss Landing	7-24-54	Siletz	3	66.8	8.0
6-13	Moss Landing	7-24-51	Vand. Pd.	3	61.5	6.2
6-13	Moss Landing	7-26-09	Trask	3	59.3	5.0
6-13	Moss Landing	7-24-51	Vand. Pd.	3	58.5	6.2
6-13	Moss Landing	7-24-51	Vand. Pd.	3	64.6	7.0
6-13	Moss Landing	7-26-09	Trask	3	59.3	5.0
6-13	Moss Landing	7-24-51	Vand. Pd.	3	61.5	6.2
6-13	Moss Landing	7-24-45	Fall Cr.	3	66.8	8.0
6-13	Moss Landing	5-11-34	Eagle Cr.NFH	3	62.5	7.2
6-13	Moss Landing	6-59-55	Iron Gate	3	58.0	5.4
6-13	Moss Landing	6-59-55	Iron Gate	3	53.5	4.2
6-13	Moss Landing	7-24-51	Vand. Pd.	3	64.2	6.9
6-13	Moss Landing	5-11-35	Eagle Cr.NFH	3	61.9	6.6
6-13	Moss Landing	7-26-39	Rock Cr.	3	63.8	6.4

FIGURE 1.

1984 TAGGED AND NONTAGGED CALIFORNIA OCEAN COHO LENGTH

FREQUENCY DISTRIBUTION

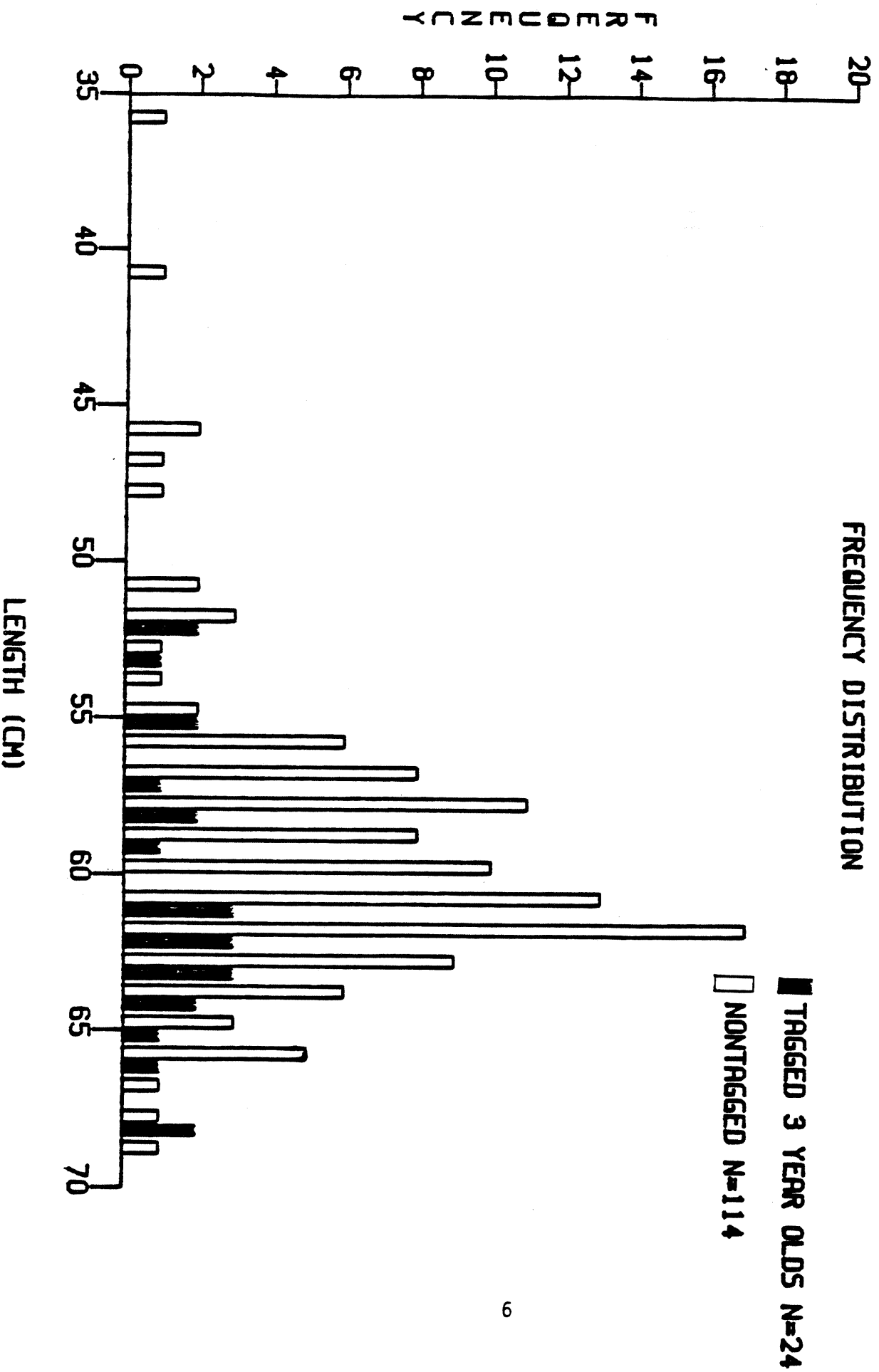


Table 2. Average dressed weight of coho salmon caught in the June 1-15 California troll fishery and recovered in the 1984 California observer program.

Year	Total Number	Total Pounds	Average Dressed a/ Weight (in lbs)
71-75 Avg.	64,023	321,993	5.03
76	246,000	1,116,000	4.54
77	8,400	40,300	4.80
78	123,700	488,300	3.95
79	49,708	232,405	4.68
80	28	112	4.00
81	4,482	22,975	5.13
82 (PRE)	6,200	31,600	5.10
83 (PRE)	11,600	50,400	4.34
84 (OBS)	94	492	5.23

a/ Does not include coho that were less than 22 inches in total length.



FIGURE 3.

1979-83 EARLY SEASON CALIFORNIA NORTH COAST TROLL CPUE  
VS OPI COHO STOCK SIZE

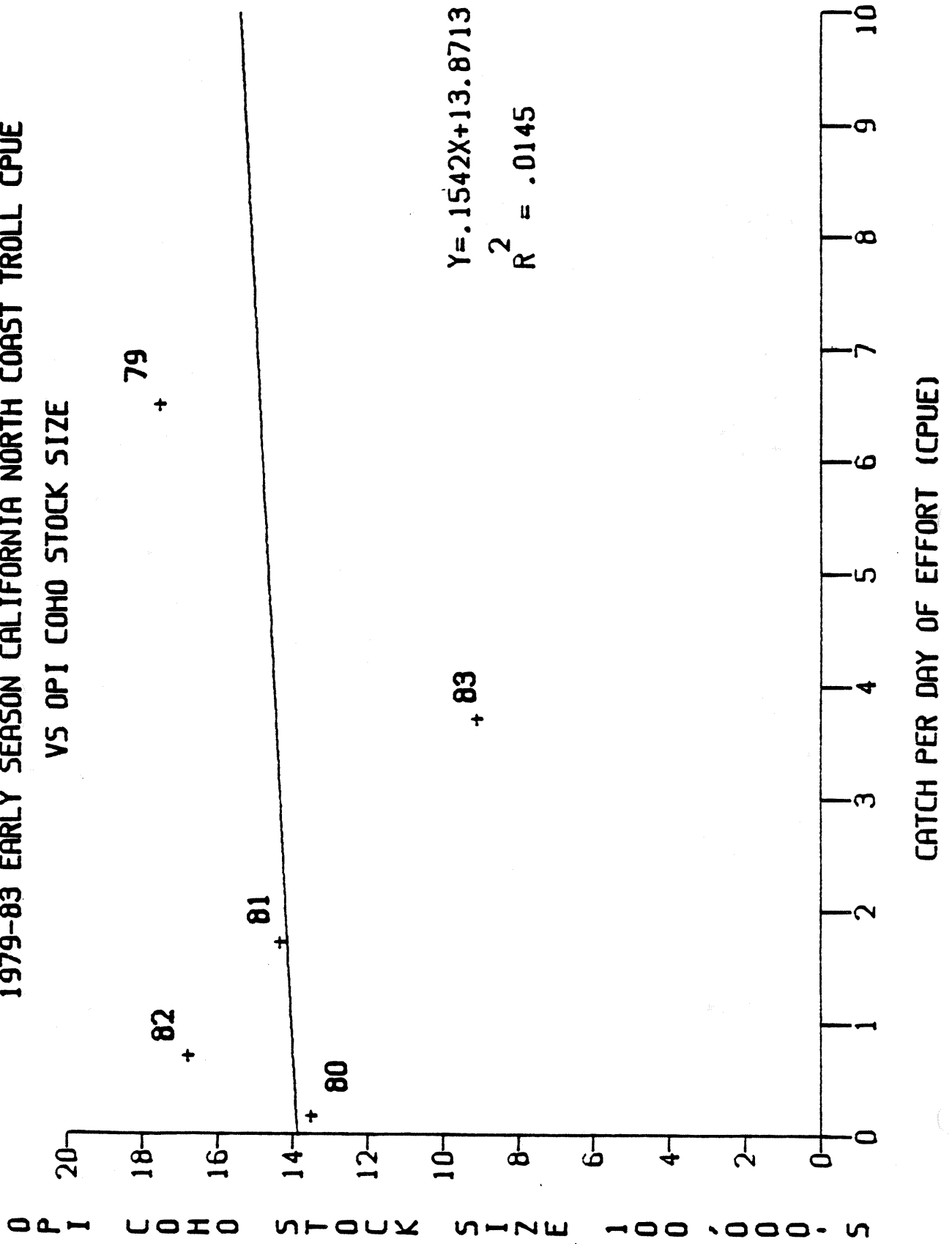




Table 3. Summary of on-board observer data collected from California and Oregon troll fisheries.

Date	Area Fished	Days Fished	Total Catch		Comments
			Coho	Chinook	
<u>California</u>					
5-21	Trinidad	1	12	4	Normal chinook trip
5-23	Trinidad	1	27	3	Normal chinook trip
6-4	Eel R.	1	12	52	Normal chinook trip
6-5	Cape Mendocino	1	0	1	Normal chinook trip
6-6	Cape Mendocino	1	0	0	Normal chinook trip
6-7	Cape Mendocino	1	0	8	Normal chinook trip
6-8	Cape Mendocino	1	0	7	Normal chinook trip
6-9	Half Moon Bay	1	3	20	Normal chinook trip
6-12	Crescent City	1	29	5	Test fishery trip
6-12	Crescent City	1	4	6	Test fishery trip
6-12	Crescent City	1	42	6	Test fishery trip
-----					
California Total		11	129	112	1.2 coho/ch. and 12 coho/day
<u>Oregon</u>					
6-5	Arago:Coos Bay	1	0	2	Normal chinook trip
6-10	Arago:Coos Bay	1	14	6	Normal chinook trip
6-11	Arago:Coos Bay	1	5	6	Normal chinook trip
6-15	Arago:Coos Bay	1	0	1	Normal chinook trip
-----					
Oregon Total		4	19	15	1.3 coho/ch. and 4 coho/day
-----					
Combined Total		15	148	127	1.2 coho/ch. 10 coho/day

Supplemental Table 1. Coho salmon scale measurements from samples collected in Brookings, Oregon in 1980 and 81 and California in 1984.

	Early June 1980	Early June 1981	Early June 1984
N =	32	30	33
#Circ. OE to Annulus end	33.8 circuli	38.9 circuli	34.9 circuli
AIS <sup>a</sup> / OE to Annulus end	3.5	3.7	3.64
#Circuli End Annulus to Edge	18.4 circuli	13.4 circuli	17.9 circuli
AIS <sup>a</sup> / End Annulus to Edge	4.6	4.3	4.47
Calc size at end of Annulus <sup>b</sup> /	42.5 cm	45.1 cm	42.1 cm
Mean Fork Length	61.8 cm	59.7 cm	59.7 cm
Total scale radius <sup>a</sup> /	267.0	261.0	267.1

<sup>a</sup>/ Units are mm at 88 magnification  
AIS = average space between circuli

<sup>b</sup>/ Calculated using scale proportion method



DR. ATTYEN  
MEMBER

## *Department of Fish and Wildlife*

506 S.W. MILL STREET, P.O. BOX 3503, PORTLAND, OREGON 97208

June 4, 1984

Senator Edward N. Fadeley, Cochairman  
Representative Grattan Kerans, Cochairman  
State Emergency Board  
State Capitol  
Salem, OR 97310

Gentlemen:

This letter is a response to the initiatives taken by the Legislative Emergency Board last Thursday, May 24, 1984 to place two observers on salmon fishing vessels off Oregon. I want to clarify my understanding of the intent of the Observer Program as well as offer background and suggestions regarding the issue of inseason salmon quota/season adjustments.

It is my understanding that the Legislature has directed the Department to use up to \$6,000 of General Funds to support two temporary employees, to be hired by the Department, to observe the incidental catch of coho by commercial trollers targeting on chinook salmon in Oregon waters south of Cape Falcon. Specifically, these observers will do the following: (1) record the number of salmon caught and the number of coho released, including the number of apparent coho mortalities, (2) retain any coded-wire tagged coho, so their origin can be determined, (3) collect scales from a representative sample of coho caught so the fish can be aged, (4) observe coho and chinook body conditions to compare to last year when the El Nino affected fish, and (5) note the apparent abundance of salmon as determined from hydro acoustic contacts. These observers should also record the water temperature and general location of the observations. The two observers should have biological training and experience in offshore fisheries. These observations will be reported to the Department, Pacific Fishery Management Council (PFMC), and Legislative Fish Task Force.

We support the gathering of such data and will work with interested fishermen to ensure that the personnel selected for this work meet the training and experience requirements. We have concern that two observers will not be enough to give a representative picture because of the variation between boats and areas fished. Accordingly, I have directed my staff to supplement this effort to the degree possible to get a greater coverage of the fishery.

It should be noted that documentation of the number of coho caught during the chinook only season will not be immediately useful in modifying the preseason stock size prediction for coho salmon or the 1984 season established by the PFMC and Fish and Wildlife Commission. In the past, inseason catch rates have not been shown to be reliable indicators of stock size. The preseason data to be collected this year will be added to the historical data.

Senator Edward N. Fodeley, Cochairman  
Representative Grattan Kerans, Cochairman  
June 4, 1984  
Page 2

As you know, the General Accounting Office (GAO) conducted an exhaustive and expensive (over \$200,000) review of the OPI coho salmon predictor and concluded it is the most accurate predictor of salmon abundance. However, we are always looking for improvement. My staff and the PFMC Salmon Plan Development Team have been reviewing historical data to determine if early season catch rates can be used to improve the accuracy of predictions and more importantly to adjust seasons/quotas. To date, we have been unable to develop inseason adjustment techniques which will actually reduce error.

We have also conducted a workshop on the uses of hydro acoustic technology to estimate fish abundance. The expert's conclusion was that we could probably not improve our coho predictions with this technology in spite of enormous expense and effort.

I would like to emphasize that we agree with the fishermen that season/quota decisions should be made using the most accurate data. Erroneous use of catch/effort data could cause the premature closure of a season - robbing fishermen of desperately needed harvestable fish - or could cause overharvest which mortgages the future of the resource and the fishermen who depend on it. Because of this, and the results of the technical evaluations so far, the PFMC has decided that no inseason adjustments are possible in 1984.

However, we believe that we should continue to search for a more accurate salmon abundance prediction. If the Legislature shares this attitude, we suggest it support an independent review of inseason adjustment methods by one of several qualified consultants. Our department is ready to work with such a qualified review team. We feel the GAO review provided much needed credibility to the OPI predictor. A review of inseason adjustment methods can also help if it is done in an objective and technically sound manner. Such a program of developing inseason adjustment methods should include the Pacific Fishery Management Council and neighboring states of Washington and California.

An objective review will be expensive and will require substantial time and administrative support. We are more than willing to do our best to cooperate with such an effort. The resource and the fishermen who depend on it deserve nothing less than our best technical effort to improve accuracy. We will submit an increase package to support such a review to the 1985 Legislative Session during the normal budget cycle.

Sincerely,



Monty L. Montgomery  
Acting Director

jmp

cc: Governor's office  
Senator Brown  
Senator Potts  
Representative Hanneman

Representative Mason  
Coastal Legislators  
Commissioners  
Salmon Advisory Committee